I, Ikuzo Tanaka, declare as follows:

1. I am a citizen of Japan residing at 24-5, Mejirodai 4-chome, Hachioji-shi, Tokyo, Japan.

2. To the best of my ability, I translated relevant portions of:

Japanese Patent Laid-Open No. 8-171892

from Japanese into English and the attached document is a true and accurate abridged English translation thereof.

3. I further declare that all statements made herein are true, and that all statements made on information and belief are believed to be true; and further that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: August 31, 2004

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ABRIDGED TRANSLATION

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Applicant: MEIDENSHA CORPORATION

Title of the Invention

ZINC-BROMINE CELL SEPARATOR AND METHOD FOR PRODUCING SAME

Claim

1. A zinc-bromine cell separator comprising constituting a unit cell by putting a separator on an intermediate cell followed by forming a cell body by stacking a plurality of said unit cells and disposing a pair of current collecting electrodes and a fastening single plate on both ends of said cell body so as to be integrally fixed in stacking, wherein an anodized aluminum layer formed by subjecting an aluminum to an anodic oxidation treatment is used as said separator.

3. The method for a zinc-bromine cell separator according to claim 2, wherein said anodized aluminum layer is obtained by the steps comprising taking out a porous anodized aluminum layer having hexagonal cells with a plurality of small through holes by separating an anodized aluminum layer formed on said aluminum plate above from a barrier layer by an inverse electrolytic stripping method, and followed by subjecting said anodized layer to heat treatment at a temperature of 850°C or more for about one hour in the atmosphere.

Paragraphs [0007], [0012] to [0013] and [0013]

[0007]

Based on a rough sketch shown in Fig. 6, the working principle of a zinc-bromine cell will be explained below. Numeral 1 in the figure is an anode side storage tank, and an anode electrolyte 2 and a bromine complex compound 3 are stored in this anode side storage tank 1. Numeral 4 is a cathode side storage tank and a cathode electrolyte 5 is stored in this cathode side storage tank 5. The anode electrolyte 2 is subjected to flowing back to the anode side storage tank 1, as an anode side pump 6 has been driven, via a four-way valve 7, as shown by an arrow in the figure, circulating anode chambers from an anode manifold 8 of the cell body, while the cathode electrolyte 5 is subjected to flowing back to the cathode side storage tank 4, as a cathode side pump 9 has been driven, circulating cathode chambers each separated by a separator 11 from a cathode manifold 10 of the cell body. Numeral 12 is an intermediate electrode and numeral 13 is a current collecting electrode.

[0012]

Problems to be solved by the invention

Although an efficiency of the zinc-bromine cell used for storage of electric power as such is required to improve an overall efficiency including

an inverter efficiency, there arises a problem of controlling a hole diameter of the separator as one of the factors inhibiting the efficiency. As mentioned above, the separator is a porous layer and required not to penetrate bromine and bromine complex compounds though it penetrates Zn^{++} ions and Br^- ions. Particularly, when the hole diameter is excessively large, a large quantity of bromine molecule (Br_2) and bromine complex compound (QBr_3) are to have penetrated the holes, thereby resulting in decrease in the efficiency of the cell.

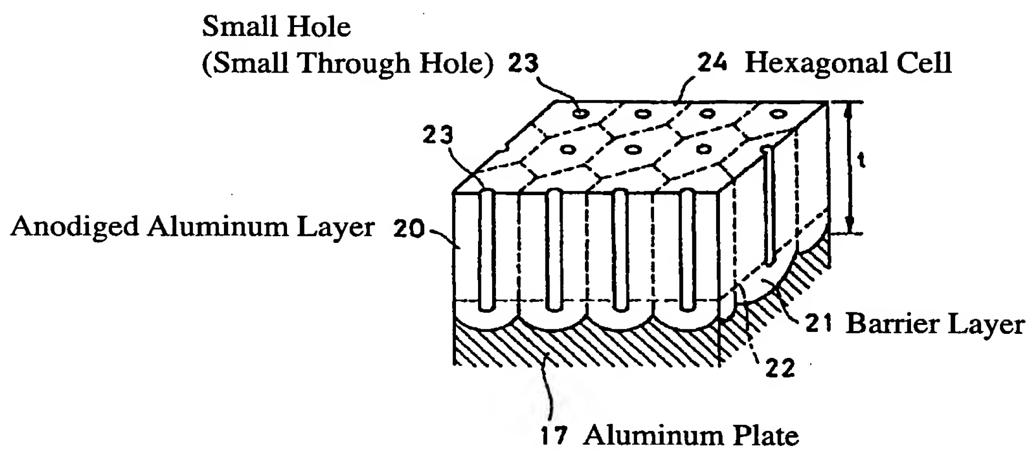
[0013]

However, the hole diameter of the separator likely varies with the molding conditions, and it is difficult to control the fine hole diameter in the method comprising melt mixing the conventional polyethylene resin with silica and DOP, followed by extrusion molding, thereby still remaining a problem not to achieve a hole shape of a through hole (or hole shape with a linearly penetrating hole) having a constant hole diameter. Thus, at present, it is difficult to obtain a separator excellent in selective penetrability.

[0018]

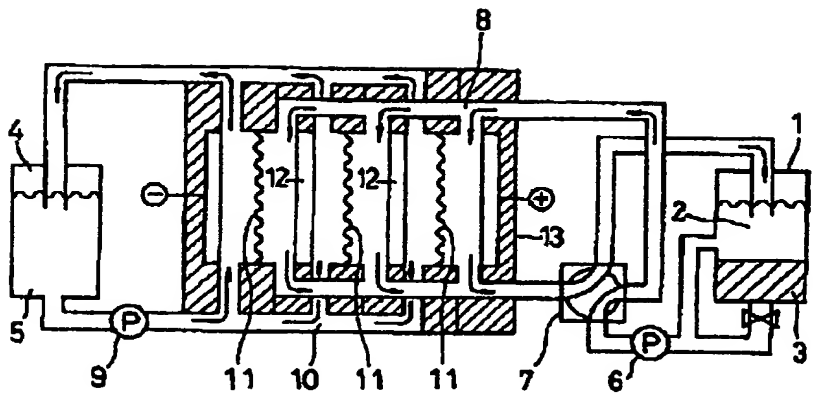
Claim 3 of the present application provides a method for obtaining an anodized aluminum layer by the steps comprising taking out a porous anodized aluminum layer having hexagonal cells with a plurality of small through holes by separating an anodized aluminum layer formed on said aluminum plate above from a barrier layer by an inverse electrolytic stripping method, and followed by subjecting said anodized layer to heat treatment at a temperature of 850°C or more for about one hour in the atmosphere.

Fig. 1



Small Hole
(Small Through Hole) 23
24 Hexagonal Cell
23
t
Anodiged Aluminum Layer 20
21 Barrier Layer
22
17 Aluminum Plate

Fig. 6



1・ ・ ・ Anode Side Storage Tank

2・ ・ ・ Anode Electrolyte

3・ ・ ・ Bromine Complex Compound

4・ ・ ・ Cathode Side Storage Tank

5・ ・ ・ Cathode Electrolyte

7・ ・ ・ Four-Way Valve

8・ ・ ・ Anode Manifold

10・ ・ ・ Cathode Manifold

11・ ・ ・ Separator

12・ ・ ・ Current Collecting Electrode